**Transcript**

**Speaker** 1: You're tuned in to 90.7 FM, k a l x, Berkeley. My name is Tesla Munson, and this is the graduates, the interview's talk show where I speak with UC Berkeley graduate students about their work here on campus and around the world. Today I'm joined by Eric knowledgist. Susan Kennedy. Did I say that right, Susan? Okay. Eric knowledges, that means spider biologist. So, um, we might stick with that one. Okay. It's a mouthful.

**Speaker** 2: Eric knowledgist is any erected to, and that encompasses more than just spiders.

**Speaker** 1: Oh, [00:00:30] yes. Yeah. Erin was telling me a little bit about this. What a water's [inaudible]

**Speaker** 2: other Arachnids Scorpions are acne. It's a Texan Mites are Arachnids what people call daddy long legs, which are often mistaken for spiders. Uh, those little, that's just like one little body segment on long, long legs. They're not spiders, but they're also arachnids. They're not spiders. Spiders. You just blew my mind right there. That's a, yeah. Little known fact. But yeah, they're, they're the, the whole tale about them having the most venomous bite of any spider when they're not even spiders, um, is also [00:01:00] nonsense. They don't have any venom. They're totally harmless. So where do these things come from? Do you have any idea these I, these myths, these myths? It's a very good question. And um, yeah, I don't know. I think it doesn't take much for something like that to get around. So if somebody just thinks they know it, you know, maybe they're mixing it up with an actual spider and somebody hears, oh, daddy long legs, it's the most Benjamin Spider. And so they think it's there. A lot of different things called daddy long legs. So then they think it's that one. And it's so fun to talk about. [00:01:30] Dangerous, creepy crawlies. I think it really captures people's attention. So yes, it's out there. I think it just gets out there. And then the next thing you know, everybody, everybody and their mother has been bitten by a brown recluse, even though they don't occur in the same area where brown reckless is even live. So

**Speaker** 1: man, and just to think that that myth got around before the Internet. Yeah. That's kind of amazing. So, okay. Uh, do you have any other myths you want to debunk? Right from the [inaudible]?

**Speaker** 2: [00:02:00] Um, there are so many. The brown recluse thing is a really, that's actually, that might be my soapbox bit unless, um, if Aaron didn't address that one already,

**Speaker** 1: she did. Uh, so Erin did talk a little bit about which spiders are poisonous in California and then you have to worry about and said not to be afraid of spiders. That's pretty much okay.

**Speaker** 2: That's good. Yeah, that's good. I'll, I'll go. I'll go more specific than with the reckless for that because that is like everybody just insists that they know that they got [00:02:30] bitten by one. And I always say, well did you see the spider? Well, no, but I know it was a spider bite cause I saw a spider in my room last night. And so it must've been that. And it's like, well probably was an insect. Probably wanted to drink your blood. Probably was not a spider, you know, was probably like a flee or a mosquito. Hmm.

**Speaker** 1: Do, um, despite her bites have a very particular look. Cause I thought, I, I thought that I knew what they look like, but I again, I could be totally wrong. I, yeah,

**Speaker** 2: I know

**Speaker** 1: [00:03:00] that quite well enough to answer that. I mean, I think that different, different spiders have different venues and different people have different allergies or tolerances to them. So the likelihood of being bitten by a spider is so slim to begin with. But if you are, if you see a spider bite you and you know that you're bitten by a spider, um, you might react badly. Um, cause the venom can be, it can be a mild neurotoxin, even if it's not a dangerously venomous spider. It could give you an SD rash or something. So I don't know that there are people talk about, oh, well I saw two little Fang marks. Um, that's not really a way [00:03:30] to diagnose a spider bite. And usually it's not two Fang marks. It's like two little bite marks from the proboscis of some biting insect instead. Um, and most spider's draws are so tiny that they actually wouldn't be able to bite people.

**Speaker** 1: A lot of doctors will also misdiagnosis things as spider bites. Um, just because you know, they don't have that expertise. That's not, that's not what they study. So they might jump to that conclusion. But all in all, we shouldn't be too worried about, we really shouldn't be worried at all. I mean, the most likely you are to be [00:04:00] bitten by a spider is when you're actively trying to smash a spider. They don't want to mess with you. They just want to live their lives. There are aggressive spiders in other parts of the world, but here in the u s we have, we have nothing like that. So we have really nothing to worry about. I mean, you know, if you're in a place with a lot of black widows and you think one of them got into your shoe or something, then shake out your shoe before you put it on. It's highly unlikely because they spend webs in there. They're pretty sedentary. But yeah, generally, I dunno, it's Kinda hard to say and I shouldn't, shouldn't just rely on anecdotal evidence, but [00:04:30] I've never been bitten by a spider in my life. And I've handled thousands of them, so we have a lot less to worry about than I think a lot of people believe. Okay. So have you always been like a defender of spiders? I have, yeah,

**Speaker** 2: my entire life. Um, I don't really know, you know, I guess I've always just liked underdog things and I feel like they've always had a really bad rep. So when I was a little kid, I would play out in the yard and I would collect spiders and, and uh, roly polies pill bugs. I called them, um, millipedes, things like that. And, and I tried to give them [00:05:00] little terrariums and, and keep them as pets. So I always appreciated them and my

parents were wonderful. They really encouraged me in that and never, you know, never tried to, I've, I sees parents nowadays with their kids and they say, Oh, don't touch that, that's gross. It's going to bite you. And it's like, it makes me so sad because these, they're doing a disservice to their kids by, maybe I shouldn't say that.

**Speaker** 1: No, I will. Maybe something I shouldn't say. Actually, I remember a few years ago when one of the parks in the bay area, the parents were complaining that they had put like a place [00:05:30] for bees to make a hive. They were like, there can't be bees in the park. They're going to think going to sting my children. It's so dangerous. It's like, wait, where are they supposed to be? This is exactly where they should,

**Speaker** 2: yeah, that's nature. That's like, that's what little nature they have left to live in. And I mean, bees again, it's like they don't want to sting you. I mean, wasps are, whilst it can be a lot more aggressive and nasty, and you know, I have my, I have my nasty, you know, they're, they probably don't want to stay in either unless they feel threatened, but they'll do it much more readily than, so it's, yeah, it's, I think there's just a lot [00:06:00] of misconception floating around and it's passed on from generation to generation. But, uh, but yeah, I just, um, I remember playing with spiders and just growing to love them. And I think when you're a small child, small things are really appealing because you're bigger than them and you have, you know, some sort of, you know, I don't want to say power, but it's like, you know, there's so many things in your life that you don't control when you're a child.

**Speaker** 2: And, um, when you can see this other tiny animal, it's like you sort of identify with it. My parents are really into natural history in nature. So they taught me that, oh, spiders eat mosquitoes [00:06:30] and ethanol. That's great. I hate mosquitoes. So I would, you know, I would try to stop my classmates and friends from smashing them a lot of the time. And sometimes it worked and sometimes it didn't. But that's, that's sort of been my, my mission throughout my life is to make other people appreciate spiders more, teach them that they're there not to be feared. They should be appreciated and, and studied because they have super interesting biology and they have a lot to teach us. So your parents are not surprised that you are in a graduate program studying spiders? No, [00:07:00] they're very supportive. And what about your Undergrad? Was that in biology?

**Speaker** 2: Classic biology. That was just biology. I went to a, um, a small, a small liberal arts school called Earlham College, which is a Quaker school in, um, southern Indiana. And so it's, it was too small to have a very specialized biology program. So it was just a biology major, but the faculty there were just fantastic. They were just the warmest, most, uh, supportive and knowledgeable, enthusiastic people. And they had just really strong background in natural history. So I started working with, um, a professor [00:07:30] named Leslie Bishop and she wasn't my academic advisor, but she was, she was one of my professors for a class. And I started working with her and um, two other students on a research project on spider biodiversity in the island of Dannika where, where is that

island? That's in the Lesser Antilles. So it's actually right between Guadeloupe and Martinique. It's just this tiny volcanic island.

**Speaker** 2: It's for such a small island. It's hugely diverse and habitat and, and, um, bio diversity. And it's a really magical place. And of course, you know, as spiders, which I already [00:08:00] love. And then a beautiful tropical island with really interesting culture and rainforests and all, all sorts of different habitats. So yeah, it can't have been too bad because you're still working on spiders and the tropical island just to different islands. Exactly. Yeah. Yeah. So it's, it's hard to, you know, it's hard to go back from that. It's hard to, what did you learn about spiders in Dominique Dominique? It was, it was sort of a, it was mostly just a survey. So it was like we wanted to see how many spiders were there kind of first just out of scientific [00:08:30] curiosity, like what is a biodiversity of spiders here? And then second for conservation purposes.

**Speaker** 2: So you know, what, what's the total bio diversity, how do we frame that in a way that convinces people to protect them and protect their habitats. We also looked at how different habitats compare as far as their biodiversity and whether they assemble just spiders in say a a rainforest is different from a montane forests versus a dry forest versus a, an a disturbed habitat, like a garden. And then we also did a comparison of, of dire and o versus nocturnal spiders. And so [00:09:00] it was, it was interesting, we found a lot of differences among habitats, a lot of differences among times a day. So as an Undergrad, you must have really loved that experience though. I mean it was wonderful. Yeah, it was. Um, yeah, probably my favorite thing about, about the whole four years. Yeah. Okay. So spider is all the way spiders are undergrad spider research project.

**Speaker** 2: And then how did you end up here at Berkeley? And I should say you're not in the a biology quote unquote department cause I, I'm an integrative biology. But you're in a different department. Yeah, I'm in the Department of Environmental Sciences, [00:09:30] policy management and um, what I study is really more biology, biology, um, natural history biology. Um, and that's the fact that my advisor is in the department that she's in is sort of, uh, a relic of a pastime when, when environmental science policy and management encompass the agricultural department. So everybody who's associated with entomology, which is the study of insects and other arthropods is in that department. I took, I took a few years off between Undergrad and Grad School, but I always knew I wanted to come back [00:10:00] and continue studying spiders. And so when I started looking at Grad schools, I started looking for advisors first. And I went on the Journal of Eric Knology, which is this, um, this journal of Spider and other Arachnid related science.

**Speaker** 2: And they had a list of people who have professors who are, who are still active and taking students. So I saw Rosie Gillespie's name, she's my advisor and I saw her research, which is super exciting. She's done tons of work on lots of islands systems and has been looking at these really big questions [00:10:30] on biodiversity patterns and evolutionary processes and has worked with these adaptive radiations, which are groups of a closely

related species that have sort of explosively diversified into lots of different species over a short time. And they're often found in island systems. So all of these things appeal to me hugely. So I, I applied to her lab and yeah, and here I am. So do you ha, can you tell us why islands are often host to these rapid diversification events? I might not be able [00:11:00] to state this most eloquently, but islands, islands are isolated.

**Speaker** 2: They're, they're isolated from other land masses usually by, by a body of water, right? And they're isolated. If it's an island chain or an island system, they're isolated from one another as well. So you have these sort of replicated habitats where there's isolation between them. And when habitats are isolated from each other, there's not very much what they call gene flow, which is a species or organisms moving from one habitat to another and potentially interbreeding with each other. And if they can't interbreed, [00:11:30] then they're going to continue evolving without exchanging genes. And they're going to, over time they're going to become more and more different from one another to the point that if they come into contact again, there are no longer able to reproduce with each other. So you end up with these separate populations, um, which ultimately turn into separate species. So just to be like a complete sai finer, this would be like idea behind

**Speaker** 1: if humans went into outer space and they went so far away and they were like completely separate from humans [00:12:00] here on earth, then maybe when they came back in this fictional universe, they would be so different because they didn't interbreed with the humans on earth that we would be different species. Yeah. These genetic incompatibilities might just build up enough to the, to the point where we're two different species. Yeah. That could be in our future. Oh Man. Yeah. Okay. Back on track though. So I would love to know more about what your lab does and I've actually spoken to someone in your lab before, a Darko who has moved on [00:12:30] to Santa Cruz, but what does your lab do and how is what you do different from the other people in the lab? It's interesting right now, so I've, I'm a fifth year, I've been in here for a while and I felt like for my first couple of years we were all sort of working,

**Speaker** 2: hitting on different things. Um, and now we've all, a lot of us are collaborating, which I think is really wonderful. Um, we're really drawing on each other for support and stuff and helping out with these various projects. But I mean, Rosie works on a lot of different systems, my visor, but, [00:13:00] but her, one of the systems that she's done a lot with and in fact she's pretty much discovered are the Hawaiian Tetra Natha species, spiders, which are this adaptive radiation. So she's, I mean she discovered and described a lot of these species and so many people in our lab historically have studied them as well. So right now I'm studying them there as a postdoc in the lab. Who's studying them? Yeah. I don't know. Should I, how much detail should I go into here? Like,

**Speaker** 1: well, just, uh, mostly I'm interested cause I know that there's a big focus on Tetric Natha spiders. Is there a common [00:13:30] name? I can call them there. It's uh, it's clunky,

but the, the long jod or weavers. Oh, the long jod or weavers. Okay, well we'll, we'll decide which ones. One of my, one of my other goals. Yeah. In

**Speaker** 2: life is to come up with a common name for them. That's more appealing to the public because long like, I mean they are launched, they have very long jaws. Um, but it's just too many words. We need something cute and you know, anyway. But yeah. Um, yeah, so there's a, a postdoc in my lab, um, Henry Henrik is a genomics guy [00:14:00] and he's done tons of work on, on the Tetra Natha and on other Hawaiian Predatory arthropods with all these studies of how their DNA degrades over time and what they're eating, how their ecology intersects with their evolutionary history. Um, and I'm working on that question as well, particularly with the Diet and their niche ecology and their evolutionary history. Um, June Lim, who I think you might've interviewed as well. Yeah, so he works in Hawaii as well, but he works on plants. But it's an interesting, it's interesting because it's a similar, it's kind of a parallel question [00:14:30] of this adaptive radiation of his pepper Romeo plants and, and how they got there originally and how they've diversified over time.

**Speaker** 2: Um, Ashley is working also on Tetra Natha, but she works on a completely different, uh, method of, of looking at their sexual behavior and their, um, their chemical communication. So nobody has yet actually characterized a, you know, a lot of arthropods, insects, spiders and another creepy crawlies use chemicals to communicate. So sense of smell is really important for them. And it's been shown in a lot of other spiders [00:15:00] to be important. But with this particular system, nobody has studied it yet. So, so she's characterizing the chemicals that they release and how they perceive each other. I'm Natalie who just joined our lab last year, is working on, um, on parasitoid wasps in Hawaii and also, and she's, she's, you know, she's at the beginning, so she's got a lot of, a lot of different directions and a lot of questions, but looking at patterns of different diversification and ecology as well, which parasitoids are infecting which hosts and, um, how it's affecting the whole ecosystem. So those who have, and there, there [00:15:30] are a lot of other folks in the lab too who are all working on these, these really interesting questions. Those are the people I, I interacted with the most, um, the most regularly and we're all, we all help each other out with a lot of stuff. So it's, yeah, it's a great dynamic.

**Speaker** 1: If you are just tuning in, you're listening to the graduates here on KLX Berkeley. My name is Tesla Monson. Today I'm speaking with Eric Knowledgist, Susan Kennedy in the Department of Environmental Science Policy and management telling us about her love for spiders and her research. Although you mentioned everyone else in your lab but you didn't [00:16:00] tell us what you exactly study. Right. So,

**Speaker** 2: um, so the whole question of, of how ecology and evolution, uh, interact with each other in the, basically in the, the evolutionary history of a group of species. That's, that's the broad question I'm interested in, but most most interesting to me. You know, aside from the fact that I love spiders and I want to study anything about them that I can, um,

I'm interested in their diet. I think that spider feeding behavior and diet is, it's a quickly growing field and it's, we're [00:16:30] getting more and more exciting data on what spider is actually eat because the, the conventional wisdom has always been that they'll just eat anything they can. They're the just these opportunistic predators and they will eat each other, which we've, you know, they eat each other a lot. We've seen a lot of that. Um, females, we eat males when they're courting often.

**Speaker** 2: I'm sure Erin talked about that a bit too. So yeah, there's this idea that they'll just eat anything, but there, there's been evidence of certain spiders that are specialized on eating certain things. Some of them, for example, are specialized on just other spiders. [00:17:00] So they have to have these special, uh, adaptations that allow them to immobilize and, and kill another spider without getting bitten themselves, without getting, uh, envenomated. Um, and then there are ones that are able to eat things like ants, which are also really noxious and aunts have a lot of defenses of their own. They have these powerful mandibles and often they'll say they'll spray acid at their enemies and things like that. So a lot of spiders will stay far away from ants, but some actually, um, black widows for example, are actually able to eight eat ants and do quite well [00:17:30] with that.

**Speaker** 2: So I think it's really interesting to look at what spiders are actually eating, what they prefer to eat. And when you're looking at an adaptive radiation like the Tetra Natha where they are super diverse and a lot of them are co-occurring in one habitat, you really wonder, well what, what allows them to be different species in this habitat aside from the fact that they're not reproducing from each with each other, what makes them so different and how are they all coexisting on a limited number of resources [00:18:00] within one space? So the idea of, um, ecological niche partitioning, which is where you have a bunch of species together and they're, they're using slightly different resources from one another and that way they're not competing with each other. They're all able to, um, to coexist and, and do pretty well. That's something that I find really interesting and, and as kind of a difficult thing to demonstrate in practice, but we do have some evidence that suggests that these spiders are doing that in their habitat, that they're [00:18:30] possibly using different resources. They're using different strategies to hunt.

**Speaker** 1: So when you, so you're interested in diet, what are the ways that you can actually see what does this spider's eating? And you just have to like camp out next to the web and see what's going on. Or,

**Speaker** 2: so that's, that's almost the way people, people have done it sort of like that in the past. And yeah, I mean it's certainly, there have been a lot of studies published of observational spider diet where you're just finding spiders. You might find a spider that has prey in its jaws and you'd say, you know, okay, you're eating this for sure. [00:19:00] You might find prey in the spider's Web, which can be really helpful if you know that the spider actually eats that prey. But sometimes the prey is just sitting there and you don't know if the spider plants to eat it or if they have eaten it. You know, some spiders,

spiders digest externally. So they just basically regurgitate a bunch of digestive enzymes on their prey and then they suck up the liquefied prey. Um, and usually it's just the insides of the prey and they leave behind the exoskeleton.

**Speaker** 2: So sometimes it's hard to tell if the prey has even been consumed or not other [00:19:30] spiders to up their prey. So. So then it's easier to tell but, but yeah, the of course, you know, the return on investment for going out and just observing spiders and seeing what they eat is relatively low. I mean, you have to spend a ton of time just finding them and being lucky enough to see them eat a, the spiders that I study are nocturnal, so I go out there with a headlamp, you know, my head lamp shines on their web and then moths fly over and the spider gates, the balls. And so that's great for the spider, but it's, you know, it's not real data because who [00:20:00] knows if they would have eaten that, if I hadn't been there shining my light on their web. So that's sort of the traditional way people have done some, some PCR based DNA studies on, on spider got content as well where they're trying to target a certain marker and that they get some data from that as well.

**Speaker** 2: But just these methods have been limited, um, until recently by things like how, you know, if you can keep the spider cold before the DNA all degrades. If you, you know, if you know what you're looking for in the past year, only able to really look for one or two different [00:20:30] things at a time. So actually the method that we're using now in my lab is, um, is a metogenomic method of just crushing up the whole abdomen of the spider, which contains digestive remains of, of all this pray. Then we, uh, we add, uh, actually a size selection step for the DNA. So, not to get into too much detail, however, but we basically choose, um, we selectively take out most of the DNA that ha that's more degraded. So, um, that's the, the DNA [00:21:00] of the pray that the spider's eaten. It's been digested so it should be fairly degraded and we try to get rid of the stuff that's higher quality because of high quality DNA belongs to the spider itself.

**Speaker** 2: So then we, with all the this digested low quality small DNA, we run a couple of pcrs and we amplify markers that, um, mostly con which is, which has been sequenced for a lot of different arthropods. And then we submit it for sequencing and, and um, get back all these reads and then we search online. There's [00:21:30] this big online database of all these DNA sequences and we use that to identify the, the taxonomy of the prey. Um, so we've, we've been working on this for about a week. We were testing it about a year ago and we've been working on it with, with Hawaiian spiders since April or May and are getting some, some pretty exciting results and we're almost ready to send off our next big batch and get more results. So, so more to come soon. But it seems to be working really well and we're getting um, pretty well resolved fine scale data on what these spiders are eating [00:22:00] and it's, um, so far it's looking pretty different for different species. So that's really exciting.

**Speaker** 1: How many prey items would you normally expect to find? Like in terms of DNA? Like is it like are they eating 50 different things or just two different things?

**Speaker** 2: That's a good question. I mean, if spiders are really generalist and opportunistic, you'd expect to find whatever they happen to co-occur with, right. Whatever they, whatever they live with them and are strong enough to take down. But then of course there are spiders that specialize on eating other spiders or [00:22:30] you know, web builders are probably gonna catch more flying insects then than ground walking insects. Yeah, I mean it's a really good question.

**Speaker** 1: Yeah. So it depends on the spider. What about how, uh, how long does the DNA last? I mean, are you getting like their last meal or are you getting what they've been eating for the last week? How far back can you go?

**Speaker** 2: It seems like we're actually going, we're going back, um, at least a couple of meals, which is really, really exciting. And it's not that surprising when you think about it because spiders can go a very long time without eating. So [00:23:00] when they eat, I think that they tend to retain the prey and that in their abdomen for a a pretty long time. Um, they can store that energy until they get their next meal. But you know, it's also, it's, it's exciting because we weren't sure if we were going to be able to go very far back because as the DNA breaks down, you know, maybe the, the fragments that we have left are too short to amplify successfully. But, but we have found within a single spider we found two or three completely different taxa of organisms. So it seems like, and you know, some of them [00:23:30] are really well-represented, which is probably the ones that were eating the most recently and others are a little bit fewer. So they probably are more broken down or more of them have been passed through the digestive system already.

**Speaker** 1: So usually it's only one insect or, or small pre that's going to be each meal. They don't eat like a bunch of, they don't have like a banquet go in.

**Speaker** 2: Um, well I don't know if you feed, I mean if you have a spider in captivity and you just feed it over and over again, I think it'll probably keep eating for a while. But in nature, I don't think [00:24:00] it's very common for them to come across multiple prey items all at once. That's the, that's the limit of my knowledge on them.

**Speaker** 1: Yeah. No, no, no worries at all. What about, how do you, uh, you mentioned that you crush up the spiders, so does that mean that you're going to Hawaii to capture these fighters and then bringing them back here to California?

**Speaker** 2: That's right. Yeah. So we do this. That's the one thing I find really sad about studying spiders is that we do have to kill a lot of them. Um, but I hope that, you know, I hope that the results will be worth it and, and ultimately we'll justify more of a conservation [00:24:30] effect in the long run of people knowing more about them, caring more about them and wanting to protect them. But, but yes, we traveled to Hawaii. I've been there four or five times. I think the first couple times I went, I was doing an ecological study

where I did observations in the field. So I was there for much longer periods of time. Um, and more recently I've gone and just collected spiders and brought them back. So that's usually a little bit quicker. Should I talk about how we collect them?

**Speaker 1:** Yeah, definitely. Cause talk about how you collect them. I just wanted to make sure that I was painting you correctly as that person on the plane with like a box full of stuff.

**Speaker 2:** [00:25:00] Oh well yeah. I can't take them in my carry on because there's, um, we, we preserve them in alcohol. Um, which is wishes the best for saving the DNA, but you're allowed to send them into your check baggage, thankfully. So I always, I always put them in my check baggage with a very earnest, heartfelt notes saying, these are for my phd research. Please call me if you have any questions. And I put the permits on there too. So if the TSA has any problem, they can hopefully talk to me before they try to throw anything away. And Yeah. So yeah, it's um, it's always exciting. [00:25:30] It's either flying with them or shipping them back and shipping them as probably a little bit less stressful, but then it's, yeah, I feel better when they're with, it's a little nail body until it,

**Speaker 1:** yeah. So, so how do you collect them? What's your strategy?

**Speaker 2:** There are a lot of ways to collect them. And actually if you go to Hawaii, if you go to the native forests of Hawaii at night when the spiders are active, you can almost just walk around. You'll see them everywhere. It's really magical. As soon as it gets dark, there's just everywhere you look, there are these spiders and lots of different species of them all, all together. So you can just walk around with a vial. And with most of these spiders you [00:26:00] just stick a vile underneath it and the spider gets a little bit scared and it drops down because the natural response is spider is usually when they're, when they're threatened is to drop and they'll, they'll drop on a, on a line of silk so that they can find their way back up again if they need to. But they drop and they drop right into your bio because your bio is sitting there.

**Speaker 2:** So that's one way. If you're out during the daytime, the spiders are all deeply in hiding, so you probably won't see very many of them. But we do something, this method, which is basically called beating, where you hold a beat sheet, which is this, um, piece of fabric held open by, by [00:26:30] some sticks. So it's like a, a flat square fabric. Uh, you hold that underneath the vegetation and you, you hit the vegetation with a stick. Or sometimes if it's more delicate, which a lot of the, a lot of Hawaiian, uh, for us as ferns and things like that, so you don't want to damage them so you can just grab the Vernon, shake it a little bit and um, everything that's on there just drops down onto your sheet and then you collected off of the sheet and you find just, yeah, just gold mines of spiders that way. So.

**Speaker 1:** Very cool man. [inaudible] man [00:27:00] does it, this episode is like flown by cause we're at, we're actually at a time right now, believe it or not. But, uh, two final questions. One, do you have any shiny results you want to present us with other than the fact that

it seems like different species are eating different things or if it's top secret, you know, it's no big deal. The, yeah, the, the Diet

**Speaker** 2: question risks, we're still working on that, so I don't have that out yet. Um, so I'll hold off on, on the preliminaries of that, but it does seem very promising. Yeah, it's, well, we did, we recently published a with, um, Henry cray and wiggle is the postdoc in my lab [00:27:30] who's working on these ecological questions with um, and all these, all these DNA and genomics related questions. We just put out a manuscript about a month ago, which is just describing the method that we use for the, uh, for the prey sequencing and, and the, the enrichment step where we selectively choose the smaller, the more degraded DNA is a big part of that. So that's exciting.

**Speaker** 1: Yeah. Congratulations. And yeah, we're, yeah, as far as the, okay, Tom, we'll just call it top secret. Yeah, that's yet to come. So keep an eye on your work if you want to know more about this and then, yeah. [00:28:00] So this always, there's always time to ask to ask you to stand on the soapbox and tell us if there's anything that you want the public to know here in the bay or around the world where people can listen to this show. Um, is there anything that you want to tell them about spiders or about biology or about what you do?

**Speaker** 2: Would really like everybody to know that I like everybody to believe. I think a lot of people know, but they just don't believe it in their heart that spiders are tremendously beneficial to people. Uh, you shouldn't kill them. You [00:28:30] shouldn't be afraid of them. They're just living their lives and they're eating things that are bad for us. They're eating mosquitoes, they're eating fleas, they're eating icky stuff that, that actually can be harmful to us and insects that can actually spread disease. Um, in fact there was, uh, a recent article in the Journal of Eric Knology about two different species of jumping spider that specialize on eating mosquitoes. And I believe both of them were found to prefer mosquitoes that had just fed on blood. So it's like, and they, you know, they're, they address the whole question of well, do the spiders like the blood to [00:29:00] nose fighters don't like the blood.

**Speaker** 2: They can only the actual insects. But this is such a beautiful example of sweaters being directly beneficial to people by taking out these, these harmful mosquitoes which are spreading deadly diseases. And other thing I'd like to say just about Brown rec looses because there's so much misinformation about them out there. Uh, the Brown recluse has, um, has a nasty bite that causes a necrosis of the tissue. It's usually not deadly. It can be deadly if people are immunocompromised or very young or very old, [00:29:30] they're super unlikely to actually bite anyone. They're not aggressive. They might bite you if you know, you know, if you roll on over onto one by accident, if you stick your foot into a shoe that has one, so you know, shake out your shoes, but more importantly, they don't exist in California. So every time somebody tells you they got bitten by a brown recluse in California, don't believe them and they will. They believe it really strongly. Always. It's like, well, no, I, I know it was a brown reckless because it looked like a, you

know, it looked like a red rash and it was [00:30:00] probably a staph infection. That's usually what it is found reckless is live in southeastern us and that's about it. So, um, so we don't have to worry about them here. We do have black widows, again, highly unlikely to bite anybody.

**Speaker** 1: No, I think this is a really good point. Especially, I mean, especially these days when conservation is so important and just having an appreciation for nature is so important as we like faced this turning point in terms of whether or not we care enough to protect it. And so it's really important for people to know that spiders [00:30:30] are really good for us and they're not harmful. And it's something that we should actively think about conserving and you know, preserving for future generations. And

**Speaker** 2: Yeah. Yeah, that's, that's a really, that's a really good point. And in addition to being beneficial to us, as you know, by eating insects and everything, they're really important in the ecosystem and they're really important part of the food web. So they're eaten by lots of other animals that, that we do care about. You know, things like birds and reptiles and mammals that are usually a little bit easier to sell [00:31:00] on the conservation front. Um, spiders are a really important food source for them and just, uh, an integral part of any ecosystem. So [inaudible].

**Speaker** 1: Yeah. So spiders. Yeah. Excellent. Uh, well we're out of time here on the graduates. You've been joining us here for another episode of the graduates. As I said, it's the interview talk show where I speak with UC Berkeley graduate students about their work here on campus and around the world, including in Hawaii. I've been speaking today with Eric Knowledgist, Susan Kennedy, that means spider biologist. [00:31:30] Right. I'm saying it right still, right. Yeah. Another record. Stupid and other Arachnids too. Yeah. Um, Scorpions for example. See, yeah, I'm learning things. Uh, my name is Tesla Munson. Again, Susan Kennedy has been on the show today. She's from the Department of Environmental Science Policy and management here at UC Berkeley. And she's been telling us all about her work on spiders and her lifelong passion for spiders, which I really appreciate a lot of times when I ask people if they've been doing something their whole life, the answer is no, but you really are one of those people who was like, I love spiders. I'm going to study them. I just didn't. You are, [00:32:00] why should you? Why should you? Uh, so, uh, we'll be back in two weeks with another episode of the graduates, but until then, stay tuned. You're listening to 90.7 FM, k a l x Berkeley.